

2013 International Symposium on Extreme Ultraviolet Lithography

Toyama, Japan ● 6 - 10 October, 2013



Closing Remarks 2014 EUVL Symposium Announcement

Soichi Inoue (EIDEC)

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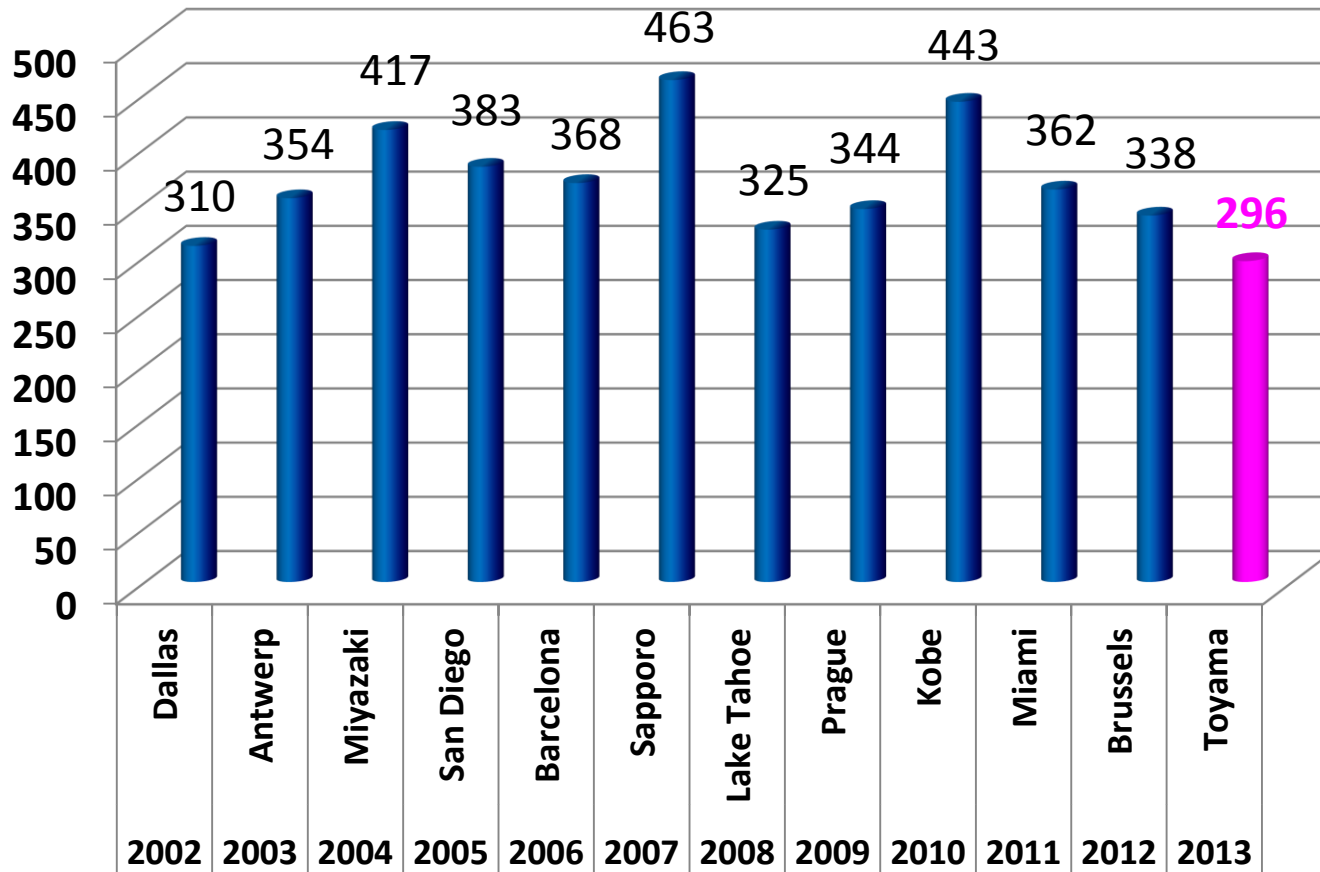
Ichiro Mori (EIDEC)

TOYAMA, JAPAN Oct. 10, 2013



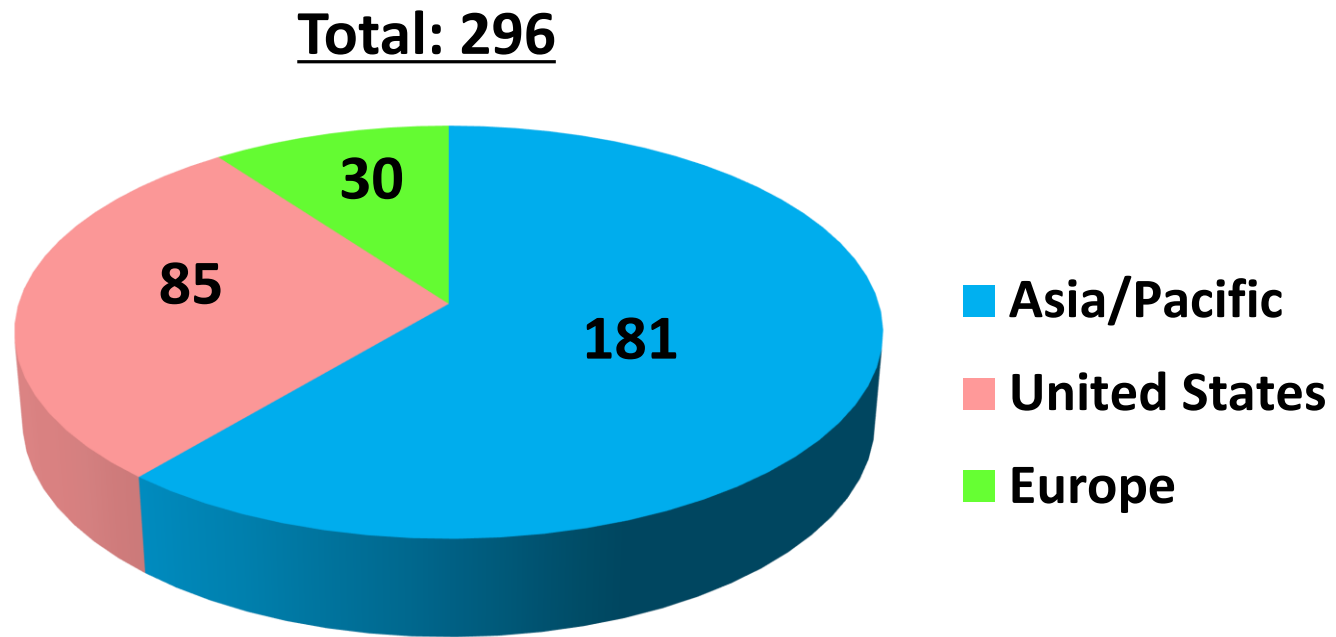
Attendance 1st to 12th Symposium (October 10th, 2013)

Toyama, Japan ● 6 - 10 October, 2013



Attendance by Geographic Region

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12th International Program Steering Committee Meeting

Toyama
October 10, 2013

2013 International Symposium on Extreme Ultraviolet Lithography

2012 EUV Focus Areas

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2008 / 22hp	2009 / 22hp	2010 / 22hp	2011 / 22hp	2012 / 22hp
1. Long-term source operation with 100 W at IF and 5MJ/day	1. Mask yield & defect inspection/review infrastructure	1. Mask yield & defect inspection/review infrastructure	1. Long-term reliable source operation with 200 W at IF*	1. Long-term reliable source operation with a. 200 W at IF in 2014 b. 500 W-1,000 W in 2016
2. Defect free masks through lifecycle & inspection/review infrastructure	2. Long-term reliable source operation with 200 W at IF	1. Long-term reliable source operation with 200 W at IF	2. Mask yield & defect inspection/review infrastructure	2. Mask yield & defect inspection/review infrastructure
3. Resist resolution, sensitivity & LER met simultaneously	3. Resist resolution, sensitivity & LER met simultaneously	2. Resist resolution, sensitivity & LER met simultaneously	3. Resist resolution, sensitivity & LER met simultaneously	3. Resist resolution, sensitivity & LER met simultaneously
• Reticle protection during storage, handling and use	• EUVL manufacturing integration	• EUVL manufacturing integration	• EUVL manufacturing integration	• EUVL manufacturing integration
• Projection / illuminator optics and mask lifetime				

Steering Committee Observations Source

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- ✓ MOPA+PP
 - Power: 55W, duty cycle: 97.5%, stability: +/- 0.5%, Die yield: >99.7%
 - ✓ Conversion Efficiency: <2.0% → 3.7% @50kHz
 - ✓ Debris mitigation: In-situ cleaning technology
 - ✓ Productivity
 - Collector Life: 80GP → 120GP
 - ✓ 750W @plasma → correspond to 175W @IF
- 250-W scanners should be operational in 2015

Steering Committee Observations

Mask

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- ✓ Several high resolution mask defect review system came on line. (Sharp, SERM, Micro-CSM, Tohoku Univ.,,)
- ✓ Pellicle
 - Polysilicon free standing: 80x80mm
 - Target: commercialization (110 x 144 mm) ~2015
 - Remain concerned with defect adders during use
- ✓ High NA discussion is in process
 - Chip makers prefer to keep full field even using 9". Mask/equipment makers prefer to keep 6".
 - Mask structure for x4, 6"

Steering Committee Observations

Resist

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- ✓ There is incremental improvement in resist meeting resolution and sensitivity. LWR/LER and pattern collapse are still issue.
 - NTD resist is becoming one of the potential candidate.
 - New inorganic material with new process shows promise.
- ✓ Capacity of outgas testing is increasing gradually but still less than the target (250 samples/month)
- ✓ Inconsistency of pass/fail for outgas testing among sites currently in discussion.

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2013 EUV Focus Areas

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Key Focus Areas	Rank*	StdDev
Long-term reliable source operation with: <ul style="list-style-type: none">- 125 W at IF in 2014- 250 W at IF in 2015	1	0
Mask yield & defect inspection/review infrastructure	2.1	0.36
Resist resolution, sensitivity & LER met simultaneously	3.6	0.68
Keeping mask defect free <ul style="list-style-type: none">- Availability of pellicle meeting HVM requirement- Minimize defect adders during use	3.2	0.62

Source has been ranked as the #1 concern by all steering committee members.

*) Average of steering committee member votes

2009-2013 EUV Focus Areas

22nm HP Insertion

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2009 / 22hp	2010 / 22hp	2011 / 22hp	2012 / 22hp	2013 / 22hp
1. Mask yield & defect inspection/review infrastructure	1. Mask yield & defect inspection/review infrastructure	1. Long-term reliable source operation with 200 W at IF*	1. Long-term reliable source operation with a. 200 W at IF in 2014 b. 500 W-1,000 W in 2016	1. Long-term reliable source operation with a. 125 W at IF in 2014 b. 250 W in 2015
2. Long-term reliable source operation with 200 W at IF	1. Long-term reliable source operation with 200 W at IF	2. Mask yield & defect inspection/review infrastructure	2. Mask yield & defect inspection/review infrastructure	2. Mask yield & defect inspection/review infrastructure
3. Resist resolution, sensitivity & LER met simultaneously	2. Resist resolution, sensitivity & LER met simultaneously	3. Resist resolution, sensitivity & LER met simultaneously	3. Resist resolution, sensitivity & LER met simultaneously	3. Keeping mask defect free - Availability of pellicle mtg HVM req't - Minimize defect adders during use
• EUVL manufacturing integration	• EUVL manufacturing integration	• EUVL manufacturing integration	• EUVL manufacturing integration	4. Resist resolution, sensitivity & LER met simultaneously



2014 EUVL Symposium Announcement

Stefan Wurm

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Closing Remarks

Ichiro Mori

2013 International Symposium on Extreme Ultraviolet Lithography

Thank you !!

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- **Symposium Co-Chairs:**
Toshiro Itani, Kurt Ronse, Stefan Wurm
- **Program Committee**
Soichi Inoue
Winfried Kaiser, Patrick Naulleau, Seong-Sue Kim
- **All paper/poster presenters**
- **Steering Committee & Session Chairs**

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Thanks to Our Sponsors!

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2013 EUVL Symposium

Thanks to Symposium Support Team!!

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Thank you and see you next year!